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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,023	09/25/2003	Jerry D. Burchfiel	BBNT-P01-247	7840

28120 7590 04/04/2007

FISH & NEAVE IP GROUP
ROPES & GRAY LLP
ONE INTERNATIONAL PLACE
BOSTON, MA 02110-2624

EXAMINER	
CHOW, CHARLES CHIANG	
ART UNIT	**PAPER NUMBER**
2618	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/04/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/671,023	BURCHFIEL, JERRY D.	
	Examiner	**Art Unit**	
	Charles Chow	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 22 February 2007.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-41 is/are pending in the application.

4a) Of the above claim(s) 13,16-36 and 38-40 is/are withdrawn from consideration.

5)☒ Claim(s) 41 is/are allowed.

6)☒ Claim(s) 1-12, 14-15, 37 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

1. This office action is for amendment filed on 2/22/2007.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3, 15, 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuo (JP 05-090,989) in view of Quesinberry et al. (US 3,821,738).

For claim 1, Tokuo discloses a method of communicating with a target vehicle [method steps in drawing 5; receiving set used for the car to communication with the satellite in paragraph 0002; satellite at Qi as the target vehicle, paragraph 0014],

comprising determining a vector [line of sight directional unit vector e_i, paragraph 0016] between a reference vehicle [self-vehicle at P, drawing 4, paragraph 0015] and a target vehicle [satellite at Qi, drawing 4, paragraph 0014, 0016] in a global coordinate system [GPS system in paragraph 0001]; and

performing at least one of antenna selection, antenna steering and antenna gain calculation, based on the computed vector, to communicate with the target vehicle via at least one antenna [the selecting, rotating, of antenna based on the direction of maximizing of the antenna gain, the inner product to the direction of the unit vector e_i in (57) abstract, paragraph 0014-0020, the sum of inner product S = e_{ANT} dot e_1 + e_{ANT} dot e_2 + e_{ANT} dot e_3 + e_{ANT} dot e_4, referring to this equation in page 3 of the Japanese language].

Tokuo teaches the computation of directional unit vector e_i based on Ri, Qi, P [described in paragraph 0016], but fails to clearly teach the translated vector.

Quesinberry et al. [Quesinberry] teaches the translating the vector into a vehicle coordinate system that is referenced to the reference vehicle to produce a translated vector [the transformation of angular quantity from the beam of line of sight axes system to the aircraft axes system, using the T transform, col. 6, lines 47 to the bottom of the page, equation 4-5], in order to correct the antenna direction error by referencing the antenna coordinates to aircraft axes system. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to upgrade Tokuo with Quesinberry's T transform, in order to correct the antenna direction error by referencing the error angle to the aircraft axes system.

For claim 2, Tokuo teaches the wherein the at least one antenna comprises a plurality of antennas [antenna 4a, 4b] and wherein performing antenna selection [selecting antenna in abstract].

Tokuo teaches the selecting an antenna of the plurality of antennas that maximizes a dot product of $\mathbf{i}_{\mathbf{v\,local}}$ dot $\mathbf{i}_{\mathbf{a}}$ for each antenna, wherein $\mathbf{i}_{\mathbf{a}}$ comprises a vector, in the vehicle coordinate system, that points in a direction of a maximum gain of a corresponding antenna of each of the plurality of antennas [the selecting antenna based on inner product of the unit vectors representing the position of each satellite and the unit vectors in a direction maximizing the gain of the antenna in abstract, paragraph 0019-0020; the maximizing the sum S = $e_{\mathbf{ANT}}$ dot e_1 + $e_{\mathbf{ANT}}$ dot e_2 + $e_{\mathbf{ANT}}$ dot e_3 + $e_{\mathbf{ANT}}$ dot e_4, referring to this equation in page 3 of the Japanese language].

For claim 3, Tokuo teaches the wherein performing antenna gain calculation comprises determining a dot product $\mathbf{i}_{\mathbf{v\,local}}$ dot $\mathbf{i}_{\mathbf{a}}$ and performing a lookup of resulting dot product values to determine a gain, wherein $\mathbf{i}_{\mathbf{a}}$ comprises a vector, in the vehicle coordinate system, that points in a direction of a maximum gain of the at least one antenna [the maximizing the

sum of the inner product of the unit vectors representing the position of each satellite and the unit vectors in a direction maximizing the gain of the antenna; S = e_{ANT} dot e_1 + e_{ANT} dot e_2 + e_{ANT} dot e_3 + e_{ANT} dot e_4, paragraph 0019-0020, abstract, equation of the Japanese language].

For claim 15, Tokuo discloses a computer-readable medium containing instructions for controlling at least one processor to perform a method of communicating with a target vehicle [CPU 12 executes program in ROM, steps in drawing 5, to communicate with satellite, as the target vehicle], the method [steps in drawing 4] comprising determining a vector [directional unit vector e_i] between a reference vehicle [self vehicle at position p] and a target vehicle [satellites at Qi] in a global coordinate system [paragraph 0001];

performing at least one of antenna selection, antenna steering and antenna gain calculation, based on the computed vector, to communicate with the target vehicle via at least one antenna [the selecting, rotating, of antenna based on the direction of maximizing of the antenna gain, the inner product to the direction of the unit vector e_i in (57) abstract, paragraph 0014-0020, the sum of inner product S = e_{ANT} dot e_1 + e_{ANT} dot e_2 + e_{ANT} dot e_3 + e_{ANT} dot e_4, referring to this equation in page 3 of the Japanese language].

Tokuo fails to teach the translated vector.

Tokuo teaches the computation of directional unit vector e_i based on Ri, Qi, P [described in paragraph 0016], but fails to clearly teach the translated vector.

Quesinberry et al. [Quesinberry] teaches the translating the vector into a vehicle coordinate system that is referenced to the reference vehicle to produce a translated vector [the transformation of angular quantity from the beam of line of sight axes system to the aircraft axes system, using the T transform, col. 6, lines 47 to the bottom of the page,

equation 4-5], in order to correct the antenna direction error by referencing the antenna coordinates to aircraft axes system. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to upgrade Tokuo with Quesinberry's T transform, in order to correct the antenna direction error by referencing the error angle to the aircraft axes system.

For claim 37, Tokuo discloses a system for communicating with a target vehicle [the satellite Qi as the target vehicle in the system shown in drawings 1-6, paragraph 0010-0013],

comprising means [the CPU 12 runs program in ROM, paragraph 0013, 0016] for determining a vector [the line of sight of the unit vector e_i, paragraph 0016] between a reference vehicle [self-vehicle at P, drawing 4, paragraph 0015] and a target vehicle [satellite at Qi, drawing 4] in a global coordinate system [GPS system in paragraph 0001];

means [CPU 12 run programs in ROM to perform steps S5-S11 in drawing 5] for performing at least one of antenna selection, antenna steering and antenna gain calculation, based on the computed vector, to communicate with the target vehicle via at least one antenna [the selecting, rotating, of antenna based on the direction of maximizing of the antenna gain, the inner product to the direction of the unit vector e_i in (57) abstract, paragraph 0014-0020, the sum of inner product S = e_{ANT} dot e_1 + e_{ANT} dot e_2 + e_{ANT} dot e_3 + e_{ANT} dot e_4, referring to this equation in page 3 of the Japanese language].

Tokuo teaches the computation of directional unit vector e_i based on Ri, Qi, P [described in paragraph 0016], but fails to clearly teach the translated vector.

Quesinberry teaches the means for translating the vector into a vehicle coordinate system that is referenced to the reference vehicle to produce a translated vector.

[the computer 22 performs calculation, the T matrix calculator for calculating the T transform, for the transformation of angular quantity from the beam of line of sight axes system to the aircraft axes system, using the T transform, col. 6, lines 47 to the bottom of the page, equation 4-5], in order to correct the antenna direction error by referencing the antenna coordinates to aircraft axes system. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to upgrade Tokuo with Quesinberry's T transform, in order to correct the antenna direction error by referencing the coordinates to self vehicle at P.

3. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuo in view of Quesinberry, as applied to claim 1 above, and further in view of Soliman et al. (US 2003/0092,380 A1).

For claim 5, Tokuo, Quesinberry fail to teach the features for this claim.

Soliman et al. [Soliman] teaches the wherein the at least one antenna comprises a phased array antenna, wherein the phased array antenna has its own coordinate unit directions $\mathbf{i}_1$, $\mathbf{i}_2$ and $\mathbf{i}_3$ wherein $\mathbf{i}_1$ points along a surface of the phased array antenna in one direction, $\mathbf{i}_2$ points along the phased array antenna surface in an orthogonal direction, and $\mathbf{i}_3$ is equal to a cross product of $\mathbf{i}_1$ and $\mathbf{i}_2$ and is a unit vector normal to the phased array antenna's surface [the position vectors of the user's phase antenna 103 at U is Ux, Uy, Uz in the paragraph 0040, 0049. As known in the mathematics, the directional unit vector can be derived by dividing vector Ux, Uy, Uz with their respective magnitude, which are the claimed $\mathbf{i}_1$, $\mathbf{i}_2$ & $\mathbf{i}_3$; according to the known mathematics, the cross product of Ux & Uy is in the directional vector Uz, which is the claimed $\mathbf{i}_3$, a cross product of $\mathbf{i}_1$ & $\mathbf{i}_2$, normal to the phased array antenna's surface], in order to determine the position information of the antenna in terms of

the directional referencing vectors. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tokuo, Quesinberry with Soliman's antenna position vectors, in order to determine the antenna position for antenna direction based on the antenna position information.

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuo in view of Quesinberry, Soliman, as applied to claim 5 above, and further in view of Drane Jr. et al. (US 3,704,464).

For claim 6, Tokuo, Quesinberry, Soliman fail to teach the features for this claim. Drane teaches the wherein performing antenna steering comprises commanding the at least one antenna to present a phase gradient of 2 *pi / (λ * $\mathbf{i}_1$ dot $\mathbf{i}_{v\ local}$) in a direction corresponding to the unit direction $\mathbf{i}_1$ and 2 *pi / (λ * $\mathbf{i}_2$ dot $\mathbf{i}_{v\ local}$) in a direction corresponding to the $\mathbf{i}_2$ unit direction [the phase of the amplitude radiation pattern E(μ) is 2 *pi / (λ * dn * cos θ), which is in direction θ of the line of antenna array ; the col. 3, lines 40-51 & in table 1, it shows dn is the location of nth element in antenna array & μ is cos θ where θ is measured from line of antenna array, col. 2, lines 60-67], in order to formulating the antenna radiation pattern by using equation of E(μ). Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to upgrade Tokuo, Quesinberry, Soliman with Drane's phase parameters 2 *pi / (λ * dn * cos θ), in ordre to formatting the antenna radiation pattern by using the equation E(μ).

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuo in view of Quesinberry, as applied to claim 1 above, and further in view of Wirtz et al. (US 6,988,049 B1).

For claim 7, Tokuo, Quesinberry fail to teach the wherein the global coordinate system comprises at least one of a World Geodetic System (WGS) and Military Grid Reference System (MGRS).

Wirtz teaches these features [Fig. 2A, col. 5, lines 32-45 & col. 4, lines 37-46], in order to obtain an accurate target coordinates [col. 2, lines 16-21]. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to upgrade Tokuo, Quesinberry with Wirtz's WGS & MGRS, in order to obtain an accurate target coordinates by utilizing WGS, MGRS.

6. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuo in view of Quesinberry, as applied to claim 1 above, and further in view of Bruzzone (US 6,987,745 B1).

For claim 8, Tokuo, Quesinberry fail to teach the features in this claim.
Bruzzone teaches the wherein translating the vector v-top-arrow into a vehicle coordinate system comprises determining a unit gravity vector in the vehicle coordinate system [the determining of the gravitational unit vector g via gravitational filed sensors in step S4 Fig. 8, Fig. 7 & col. 7, line 66 to col. 8, line 21; microprocessor 18 calculates required parameters from magnetic & gravity sensors in col. 6, lines 15-19; for mobile phone antenna in Fig. 2, col. 2, lines 57 to col. 3, line 8], the improved calculation with the consideration of the effect of local magnetic & gravitational field to the antenna, in order to accurately correct the antenna pointing direction [col. 5, lines 58-62]. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Tokuo, Quesinberry with Bruzzone's calculating of unitary gravity g, in order to correct antenna pointing direction.

For claim 9, Tokuo, Quesinberry & Gendren fail to teach the features in this claim.

Bruzzone teaches the wherein translating the vector v-top-arrow into a vehicle coordinate system comprises determining a unit magnetic field vector $\mathbf{i_m}$ in the vehicle coordinate system [the determining of the unit magnetic field h from magneto-resistive field sensor in step 3 in Fig. 8, Fig. 7 & col. 7, lines 48-65; microprocessor 18 calculates required parameters from magnetic & gravity sensors in col. 6, lines 15-19; for mobile phone antenna], for the accurately correcting of the antenna pointing direction [col. 5, lines 58-62]. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to upgrade Tokuo, Quesinberry with Bruzzone's calculating of unitary gravity g, in order to accurately correct antenna pointing direction.

For claim 10, Tokuo, Quesinberry fail to teach the features in this claim. Bruzzone wherein translating the vector v-top-arrow into a vehicle coordinate system comprises converting the unit magnetic field vector to create a unit vector that is referenced to true north [the converting magnetic field with the declination angle between North and orizontal projection of magnetic field, step S8 in Fig. 8, col. 6, line 61 to col. 7, line 20], using the same reason in claim 9 above to combine Bruzzone to Tokuo & Quesinberry.

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuo in view of Quesinberry, Bruzzone, as applied to claim 10 above, and further in view of Soliman-'380 A1.

For claim 11, Tokuo, Quesinberry, Bruzzone fail to teach the features in this claim. Soliman teaches the wherein translating the vector v-top-arrow into a vehicle coordinate system comprises determining a unit vector in the east direction [unit vector n pointing north in equation 3 in paragraph 0052-0054], in order to correct antenna pointing direction. Therefore, It would have been obvious to one of ordinary skill in the art at the time the

invention was made to upgrade Tokuo, Quesinberry, Bruzzone with Soliman's n, in order to correct antenna pointing direction.

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tokuo in view of Quesinberry and Wirtz-'049 B1.

For claim 14, Tokuo teaches a reference vehicle [self-vehicle at P], comprising a receiver [drawing 2] coupled to at least one antenna [4a, 4b]; and

processing logic [CPU 12 run program in ROM, paragraph 0013] configured to determine a line of sight vector [line of sight directional unit vector e_i, paragraph 0016] between the reference vehicle [self-vehicle at position p, paragraph 0015] and a target vehicle [satellite at Qi, drawing 4] in a global coordinate system [GPS system in paragraph 0001]; and

and perform at least one of antenna selection, antenna steering and antenna gain calculation, based on the computed vector, to communicate with the target vehicle via the at least one antenna [the selecting, rotating, of antenna based on the direction of maximizing of the antenna gain, the inner product to the direction of the unit vector e_i in (57) abstract, paragraph 0014-0020, the sum of inner product S = e_{ANT} dot e_1 + e_{ANT} dot e_2 + e_{ANT} dot e_3 + e_{ANT} dot e_4, referring to this equation in page 3 of the Japanese language].

Tokuo fails to teach the transmitter; the translated vector.

Quesinberry teaches the transmitter/receiver 14; the translate the vector into a vehicle coordinate system that is referenced to the reference vehicle to produce a translated vector [the transformation of angular quantity from the beam of line of sight axes system to the aircraft axes system, using the T transform, col. 6, lines 47 to the bottom of the page, equation 4-5], in order to correct the antenna direction error by referencing the antenna

coordinates to aircraft axes system. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to upgrade Tokuo with Quesinberry's T transform, in order to correct the antenna direction error by referencing the coordinates to self vehicle at P.

Tokuo & Quesinberry fail to teaches the wherein the global coordinate system comprises at least one of a World Geodetic System WGS and Military Grid Reference System MGRS.

Wirtz teaches these features [Fig. 2A, col. 5, lines 32-45 & col. 4, lines 37-46], in order to obtain an accurate target coordinates [col. 2, lines 16-21]. Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to upgrade Tokuo, Quesinberry with Wirtz's WGS & MGRS, in order to obtain an accurate target coordinates by utilizing WGS, MGRS.

Claims Objection

9. Claims 4,12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The cited prior arts, **Gendreu-'507, Bruzzone-'745 B1, Soliman-'380 A1 & Airey et al. (US 2002/0124,424 A1)** fail to provide the reason to combine with **Quesinbery & Tokuo,** for the features of performing antenna gain calculation comprising the approximating antenna gain as a low-order polynomial function of a dot product $\mathbf{i}_{v\ local}$ dot $\mathbf{i}_a$, wherein $\mathbf{i}_a$ comprises a vector, in the vehicle coordinate system, that points in a direction of a maximum gain of the at least one antenna in claim 4;
the creating translation matrix M-top-arrow to translate vector into vehicle coordinate system in claim 12 & the employing the matrix M-top-arrow, to translate vector V-top-arrow, into vehicle coordinate system, to produce the translated vector V-local.

Other prior arts cited in allowable subject matter are also considered for this features but fail to teach them with the proper reasoning for combining with Quesinbery & Tokuo.

Allowable Subject Matter

10. The following is an examiner's statement of reasons for allowance:

Claim 41 is allowable over the prior art of record. The prior arts fail to teach the allowable features, singly, particularly, or in combination.

Applicant has added new claim 41 based on the features from objected claim 13 mailed in the previous office action.

The prior arts fail to teach the determining a unit gravity vector $\mathbf{i_g}$, determining a unit magnetic vector $\mathbf{i_m}$ to create a unit vector $\mathbf{i_N}$ that is reference to the true north, determining a unit vector $\mathbf{i_E}$ in the east direction,

creating a translation matrix M using $\mathbf{i_g}$, $\mathbf{i_N}$ **and** $\mathbf{i_E}$, and

employing the matrix M to translate the vector into the vehicle coordinate system to produce the translated vector; and

performing at least one of antenna selection, antenna steering and antenna gain calculation, based on the translated vector, to communicate with the target vehicle via at lease on antenna.

The closest prior art **Quesinberry [US 3,821,738]** teaches the translation of the target's line of sight direction cosine Xs, Ys, Zs to aircraft axes X_A, Y_A, Z_A [col. 12, lines 9-40]; the Xs, Ys, Zs is referencing to the earth coordinate system, col. 7, lines 15-17 & col. 11 lines 26-31], but fails to teach the above allowable features.

Yoon et al. [US 2002/0147,032 A1] teaches the base station receives absolute coordinates of the mobile station from GPS information and converts the absolute coordinates to relative coordinate with respects to the position of the base station [paragraph 0081, 0040, 0078, 0047; to calculate the weight factor for antenna beam direction forming based on the converted coordinates, paragraph 0081; abstract], but fails to teach the <u>translating the vector referenced to the reference vehicle</u>, recited in the feature, the <u>translating the vector into a vehicle coordinate system that is referenced to the reference vehicle to produce a translated vector</u>

Tokuo [JP 05-090,989] teaches the line of sight directional unit vector e_i [paragraph 0016] between a reference vehicle, self-vehicle at P [drawing 4, paragraph 0015] and a target vehicle, satellite at Qi [drawing 4, paragraph 0014, 0016] in a global coordinate system [paragraph 0001], the selecting, rotating, of antenna based on the direction of maximizing of the antenna gain, the inner product to the direction of the unit vector e_i in (57) abstract, paragraph 0014-0020, the sum of inner product S = e_{ANT} dot e_1 + e_{ANT} dot e_2 + e_{ANT} dot e_3 + e_{ANT} dot e_4, referring to this equation in page 3 of the Japanese language. Tokuo teaches the computation of directional unit vector e_i based on Ri, Qi, P [described in paragraph 0016].

Other prior arts in below were also considered, but they fail to teach the above allowable features,

Gendreu [US 4,148,026] teaches the tracking of moving target, the converting of spherical coordinates into Cartesian coordinates [abstract], having the coordinate converting unit 6 [Fig. 1].

Workman [US2006/0081,050A1] teaches system and method for resolving phase ambiguity of a transducer array to determine direction of arrival of received signal [abstract, summary of invention].

Sutton [US 6,023,240] teaches the Method for determining a phase measurement error mapping using rotating antenna information [abstract].

Kanai [US 5,719,583] teaches the based station 1 in mobile communication system for rotating, calculating, antenna gain & the antenna gain selection [abstract].

James et al. [US 4,823,134] teaches the shipboard steers antenna to track satellite [abstract, Fig. 9, col. 1, lines 12-18].

Other prior arts are also considered. They are: **Soliman [US 2003/0092,380 A1], Airey et al. [US 2002/0124,424 A1], Drane Jr. et al. [US 3,704,464], Choi et al. [US 6,188,352 B1], Werntz [US 5,926,130], Wirtz et al. [US 6,988,049 B1].**

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Argument

11. Applicant's arguments filed 2/22/2007 have been fully considered but they are not persuasive.

Regarding applicant argument that Quesinberry does not teach the <u>translating the vector , line-of-sight vector, into a vehicle coordinate system that is referenced to the reference vehicle to produce a translated vector</u> [pages 11-14 of applicant amendment 2/22/2007],

Quesinberry does teach the translation of the target's line of sight direction cosine Xs, Ys, Zs to aircraft axes X_A, Y_A, Z_A [col. 12, lines 9-40; Xs, Ys, Zs is the relative to, reference

to, earth coordinate system, col. 7, lines 15-17 & col. 11 lines 26-31], for the translation of the target line of sight vector Xs, Ys, Zs, to the axes, X_A, Y_A, Z_A, of the aircraft vehicle, as the referenced to the reference vehicle, aircraft.

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Chow whose telephone number is (571) 272-7889. The examiner can normally be reached on 8:00am-5:30pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR

only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Charles Chow CC

March 23, 2007.

EDWARD F. URBAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600